भारतीय मानक
Indian Standard

IS 17513 : 2020

कृषिवस्त्रादि — कृषि और बागवानी प्रयोजनों के लिए पौधा संबल जाल — विशिष्टि

Agro Textiles — Plant Support Nets for Agriculture and Horticulture Purposes — Specification

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November 2020 **Price Group 3**

Technical Textiles for Agro-tech Sectional Committee, TXD 35

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Technical Textiles for Agro-tech Sectional Committee had been approved by the Textiles Division Council.

Plant support nets are widely used for agricultural and horticultural purposes. These nets promote plant health and increases quality yields by straightening the crop stem.

Plant support nets ensures better exposure to light and air to plants by maximizing the crop density and also protects them from natural hazards or accidental crushing due to persons walking along the crop rows. It can be used horizontally or vertically depending on the types of crops and crop growing behavior by maintaining optimal separation between the plants.

In case of flowers (floriculture), plant support nets leads to a better rate of flower pollination as the flowers remained straightened. Plucking of flowers also became easy with the use of these nets.

These nets also enhances quality yields by protecting the vegetables crop/flowers plantations from the heavy rains by keeping them off the ground, which helps reduce rot and disease from the soil/ground thus increases market value and income to the growers. Both for vegetable and flowers, the plants remain upright and facilitate easier crop care and harvest.

The composition of the Committee responsible for the formulation of this standard is given in Annex C.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

AGRO TEXTILES — PLANT SUPPORT NETS FOR AGRICULTURE AND HORTICULTURE PURPOSES — SPECIFICATION

1 SCOPE

This standard prescribes constructional and other performance requirements for plant support nets for agriculture and horticulture purposes to provide support to flora and vegetation.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purposes of this standard the definitions given in IS 16366 shall apply.

4 MATERIALS

4.1 HDPE Filament Yarn

Filament yarn shall be manufactured from HDPE granules, which shall be UV stabilized by adding suitable UV stabilizer. Depending upon the type of nets, 2 filament yarns for Type I nets, 3 filament yarns for Type II nets and 4 filament yarns for Type III nets shall be extruded simultaneously. The linear density of the resultant filament yarn used for manufacture of plant support nets shall be 560, 840 and 1120 for Type I, Type II and Type III plant support nets respectively. As agreed to between the buyer and the seller, coloured filament yarn shall be manufactured using colour master batch. The denier of filament yarn shall be subjected to the following tolerances:

a) ± 10 percent on individual value; and
b) ± 5 percent on average.

4.1.1 The heat shrinkage of the filament yarn at 60 °C shall not exceed 5 percent when subjected to the specified temperature for a period of 10 min in an air circulating oven. The heat shrinkage of the filament yarn at 95 °C shall not exceed 8 percent when subjected to the specified temperature for a period of 10 min in hot water bath.

5 TYPES

Based on the twine type (number of plies) and twine diameter, the filament plied knotted plant support nets shall be classified as follows:

a) *Type I* — Twine type 560 D/3 ply and nominal twine diameter of 0.50 mm;
b) *Type II* — Twine type 840 D/6 ply and nominal twine diameter of 1.25 mm; and
c) *Type III* — Twine Type 1120 D/6 ply and nominal twine diameter of 1.50 mm.

6 MANUFACTURE

6.1 Twine

The HDPE filament yarns shall be converted into twine with applicable number of plies as per the type of the plant support net as specified in **5**. The twine so manufactured shall conform to the requirements as specified in Table 1.

6.2 Fabric

The fabric used in the manufacture of plant support nets shall be made through knotted netting machines and shall have a width as per the agreement between the buyer and the seller. The knot shall be firmly tightened during manufacture. A tape of 3.0 ± 0.2 mm width or filament yarn of suitable diameter having the name of the manufacture and type shall be provided at one end of the fabric which shall run through the complete length of the roll for identification of manufacture.

6.3 Colour

The colour or a mixture of colour of the plant support nets fabric shall be as per the agreement between the buyer and the seller. The colour/shade shall be as specified in the contract or order. In case a sample has been agreed upon and sealed, the supply shall be made in conformity with the sample in such respects.

6.4 Tie Cord

A braided or twisted tie cord of minimum 4 mm diameter shall be provided at each corner of the plant support net. The length, and colour of the tie cord shall be as agreed between buyer and the seller.

Table 1 Requirements for Twine

(*Clause* 6.1)

Sl No.	**Characteristic(s)**	**Requirement(s)**			**Tolerance**	**Method of Test, Ref to**
		Type I	Type II	Type III		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Average denier of filament yarn, Dry condition	560	840	1120	± 5 percent	IS 5815 (Part 2)
ii)	Number of plies	3	6	6	–	Visual
iii)	Nominal twine diameter, mm	0.50	1.25	1.50	± 10 percent	IS 5815 (Part 1)
iv)	Twist per meter (TPM):					IS 832 (Part 1)
	a) Ply TPM	280 (S way)	175 (Z way)	170 (S way)	± 10 percent	
	b) Cable TPM	270 (Z way)	170 (S way)	160 (Z way)	± 10 percent	
v)	Linear density (runnage), Dry condition, m/kg	5035	1640	1230	± 8 percent	IS 5815 (Part 2)
vi)	Twine breaking strength, Dry condition, N, *Min*	64	190	252	–	IS 5815 (Part 4)
vii)	Twine knot breaking strength, Dry condition, N, *Min*	104	303	407	–	IS 5815 (Part 4)

6.5 Over Lock Border Rope

A braided or twisted border rope of minimum 4 mm diameter shall be over lock stitched to netting sides with stitching twine. The colour of border rope shall be as agreed between buyer and the seller.

6.6 Stitching Twine

Stitching twine of minimum 1.25 mm diameter shall be used for over locking of border rope to net with a stich density of minimum 12 stiches/100 mm.

7 REQUIREMENTS

7.1 Dimensions and Mass for Square Netting

The plant support nets shall be made to the dimensions as specified in the contract or order. The following tolerance shall be permissible for length, width and mass (g/m^2):

Dimension	*Tolerance*, Percent
Length	+ 1 – 0
Width	+ 1 – 0
Mass, g/m^2	+ 5 – 0

7.2 Dimensions and Mass for Diamond Netting

The length in number of meshes and width in number of meshes shall be as agreed between buyer and the seller. The following tolerance shall be permissible for length, width and mass (g/m^2):

Dimension	*Tolerance*
Length (in no. of meshes)	+ 1 percent – 0
Width (in no. of Meshes)	+ 2 – 0
Mass, g/m^2	+ 5 percent – 0

7.3 The plant support nets fabric shall confirm to the requirements specified in Table 2.

NOTE — All the applicable requirements shall be checked in dry conditions only.

8 PACKING AND MARKING

8.1 Packing

The filament yarn plied knotted plant support nets shall be packed in roll form in length of 50 m or in bundle form or as agreed to between the buyer and the seller.

8.2 Marking

8.2.1 Each fabric roll/bundle shall be marked legibly by affixing a label with the following information:

a) Indication of the source of manufacture;
b) Type of the plant support net;
c) Declared length and width of the plant support nets;
d) Mass per square meter of the plant support nets;
e) Batch No. and date of manufacture; and
f) Any other information desired by the buyer.

Table 2 Requirements of Plant Support Nets Made from Filament Yarn Plied Knotted Yarns

(*Clause* 7.3)

Sl No.	Characteristic(s)	Requirement(s)			Method of Test, Ref to
		Type I	*Type II*	*Type III*	
(1)	(2)	(3)	(4)	(5)	(6)
i)	GSM, g/m^2	27	36	26	IS 1964
ii)	Mesh type	Square	Diamond	Square	Visual
iii)	Average mesh size, mm (tolerance of ± 2 mm)	20 MMSQ	85 MMKK (Knot to knot)	75 MMSQ	IS 15789
iv)	Mesh breaking strength, *Min*, N	48	156	224	IS 5815 (Part 5)
v)	Retention of breaking strength after UV exposure of 2500 h, percent, *Min*	← *Min* 50 percent of original actual value →			ANNEX B and IS 5815 (Part 5)
vi)	Colour fastness to artificial light[1)]	← 4 or better →			IS 105-B02

[1)] Applicable for coloured plant support nets only

8.3 BIS Certification Marking

The plant support net rolls/bundles conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the plant support net rolls/bundles may be marked with the Standard Mark.

9 SAMPLING

9.1 Lot

All plant support nets rolls/bundles of same construction dispatched to a buyer against one dispatch note shall constitute a lot.

9.2 Unless otherwise agreed to between the buyer and the seller, the number of plant support nets rolls/bundles to be selected at random from a lot shall be as given in column 3 of Table 3.

Table 3 Scale of Sampling

(*Clause* 9.2)

Sl No.	No. of Rolls/ Bundles in Lot	Sample Size	Sub-sample Size	Permissible No. of Defective Rolls/Bundles
(1)	(2)	(3)	(4)	(5)
i)	Up to 50	3	2	0
ii)	51 – 150	5	2	0
iii)	151 – 300	8	3	1
iv)	301 – 500	13	5	2
v)	501 and above	20	5	3

10 NUMBER OF TEST SPECIMENS AND CRITERIA FOR CONFORMITY

Number of test specimens and criteria for conformity shall be as given in Table 4.

Table 4 Number of Test Specimens and Criteria for Conformity

(*Clause* 10)

Sl No.	Characteristic	No. of Rolls/ Bundles	Criteria for Conformity
(1)	(2)	(3)	(4)
i)	Material and manufacture, Dimensions and mass	According to col 3 of Table 3	The defective rolls do not exceed the corresponding number given in col 5 of Table 3
ii)	All other Requirements	According to col 4 of Table 3	All the test specimens shall pass the tests

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
832 (Part 1) : 2011	Textiles — Determination of twist in yarns: Part 1 Direct counting method (*second revision*)
1964 : 2001	Methods for determination of mass per unit length and mass per unit area of fabrics (*second revision*)
5815	Methods of test for fishing gear materials
(Part 1) : 1971	Determination of thickness
(Part 2) : 1970	Determination of linear density (mass per unit length)
(Part 4) : 2018	Determination of breaking force and knot breaking force of netting yarns (*second revision*)
(Part 5) : 2005	Fishing nets — Determination of mesh breaking force of netting (*second revision*)
15789 : 2008	Fishing nets — Method of test for the determination of mesh size — Length of mesh
105-B02 : 2014	Textiles — Tests for colour fastness: Part B02 Colour fastness to artificial light : Xenon arc fading lamp test
16366 : 2015	Glossary of terms used in agrotextile

ANNEX B

[*Table* 1, *Sl No.* (v)]

UV RESISTANCE TEST

B-1 TEST SPECIMENS

The test specimens for mesh breaking strength shall be prepared as specified in IS 5815 (Part 5).

B-2 TEST CONDITIONS

B-2.1 The test shall be carried out with fluorescent UV-A lamp (340 nanometer or its equivalent).

B-2.2 The duration of the test shall be 2 500 h.

B-2.3 The test cycle shall be 8 h at 60 ± 3 °C with UV radiation alternating after 4 h at 50 ± 3 °C with condensation.

B-2.4 Irradiation level throughout the test shall be maintained at $0.63^{+0.03}_{-0.0}$ W/m².

B-3 TEST PROCEDURE

B-3.1 Determine the original average mesh breaking strength of plant support nets specimens separately as per the test specified in IS 5815 (Part 5).

B-3.2 Expose the specimens alternately to ultraviolet light alone and to condensation in one respective cycle.

B-3.2.1 The type of fluorescent UV lamp, the timing of the UV exposure and the temperature of condensation shall be as specified in **B-2**.

B-3.3 Determine the average mesh breaking strength of the specimens separately after UV exposure as mentioned above.

B-3.4 Determine the percent retention of original mesh breaking strength as follows:

Percent retention of original mesh breaking strength =

$$\frac{b}{a} \times 100$$

where

a = average mesh breaking strength before UV exposure as obtained in **B-3.1**; and

b = average mesh breaking strength after UV exposure as obtained in **B-3.3**.

NOTES

1 The UV source is an array of fluorescent lamps (with lamp emission concentrated in the UV range).

2 Condensation is produced by exposing the test surface to a heated, saturated mixture of air and water vapour, while the reverse side of the test specimen is exposed to the cooling influence of ambient room air.

ANNEX C

(*Foreword*)

COMMITTEE COMPOSITION

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